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PROPOSED DECISION DOCUMENT  
FOR THE INTERIM RESPONSE ACTION FOR  
THE IMPROVEMENT OF THE NORTH BOUNDARY SYSTEM  
AT ROCKY MOUNTAIN ARSENAL  
VIA CONSTRUCTION OF GROUNDWATER RECHARGE TRENCHES

APRIL 1988

Prepared for:

U.S. ARMY PROGRAM MANAGER'S OFFICE FOR  
ROCKY MOUNTAIN ARSENAL CONTAMINATION CLEANUP

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13. ABSTRACT (Maximum 200 words) THE OBJECTIVE OF THIS INTERIM RESPONSE ACTION IS TO CORRECT AN HYDRAULIC IMBALANCE IN THE NORTH BOUNDARY TREATMENT AND RECHARGE SYSTEM. TEN GRAVEL FILLED RECHARGE TRENCHES WILL BE CONSTRUCTED ALONG THE DOWNGRAIDENT SIDE OF THE SLURRY WALL. THIS PROPOSED DECISION DOCUMENT PROVIDES SUMMARIES OF: 1. ALTERNATIVE TECHNOLOGIES CONSIDERED 2. SIGNIFICANT EVENTS LEADING TO THE AWARDDING OF THE IRA CONTRACT 3. THE IRA PROJECT 4. THE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS, STANDARDS, CRITERIA, OR LIMITATIONS (ARAR'S) ASSOCIATED WITH THE PROGRAM.					
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PROPOSED DECISION DOCUMENT FOR THE  
INTERIM RESPONSE ACTION FOR  
THE IMPROVEMENT OF THE NORTH BOUNDARY SYSTEM  
AT ROCKY MOUNTAIN ARSENAL VIA CONSTRUCTION OF GROUNDWATER RECHARGE TRENCHES

## 1.0 INTRODUCTION

The Interim Response Action (IRA) for the Improvement of the North Boundary System at Rocky Mountain Arsenal (RMA) via construction of groundwater recharge trenches is being conducted as part of the IRA Process for RMA in accordance with the June 5, 1987 report to the court in United States v. Shell Oil Co. and the proposed Consent Decree.

This IRA project is an upgrade of an existing groundwater containment, treatment, and recharge system. The existing system includes a slurry wall, dewatering wells upgradient of the wall, a water treatment facility, and recharge wells downgradient of the slurry wall. The existing recharge system does not have the capability to distribute sufficient water in appropriate areas downgradient of the slurry wall. The result has been a hydraulic imbalance across the slurry wall. The water table on the upgradient side of the slurry wall is higher than the water table on the downgradient side of the slurry wall. This head difference could impair the overall effectiveness of the entire North Boundary Containment/Treatment System (NBC/TS).

In order to significantly improve this hydraulic imbalance, ten gravel filled recharge trenches (160 feet long, approximately 15-20 feet deep, and 3 feet wide) will be constructed along the downgradient (north) side of the slurry wall. Water will be piped under pressure from the treatment plant through a new effluent pipe to the ten trenches. Flow into each trench will be metered. A piezometer will be installed in each trench and another between the slurry wall and each trench for monitoring water elevations. A membrane will be installed on top of the gravel to prevent most gravity-induced silting of the gravel. Several additional pairs of monitoring wells will be constructed adjacent to one another but on opposite sides of the slurry wall for monitoring the hydraulic balance on either side of the barrier. To minimize maintenance of the trench system with respect to potential carbon fines carry-over, the water distribution system has been designed to accommodate internal cleaning equipment and has cleanout/flushing capabilities.

## 2.0 HISTORY OF RMA NORTH BOUNDARY SYSTEM

Rocky Mountain Arsenal occupies over 17,000 acres, approximately twenty-seven square miles, of land in Adams County, directly northeast of metropolitan Denver, Colorado. (See Figure 1, installation location map.) The property was purchased by the government in 1942 for use in World War II to manufacture and assemble chemical warfare materials, such as mustard and lewisite, and incendiary munitions. Starting in the 1950's, RMA produced the nerve agent GB (isopropyl methylphosphonofluoridate) until late 1969. Since 1970, RMA has primarily been involved with the destruction of chemical warfare materials. In addition to these military activities, a major portion of the plant facilities were leased to private industries (including Shell Chemical Co.) beginning in 1946 for the manufacture of various insecticides and herbicides.

During the 1940's and 1950's liquid industrial wastes generated at both the Chemical Plants Area and the North Plants Area were routinely discharged into several unlined evaporation ponds (labeled Basins A, B, C, D, and E) located in the center of the installation. (Figure 2 shows locations of previous disposal areas and the Plants Areas in respect to the rest of RMA.) Groundwater contamination was first noticed in the mid 1950's when minor crop damage was discovered on land north and northwest of the Arsenal. This discovery of contaminants in the groundwater led to the construction of Basin F in 1956. At that time all liquid wastes were transferred to this asphalt-lined lagoon. Solid wastes were routinely disposed of in trenches and pits located adjacent to Basin A and the Plants Areas.

In the mid 1970's two organic compounds, diisopropylmethylphosphonate (DIMP) and dicyclopentadiene (DCPD) were identified in groundwater off the installation. (Groundwater beneath RMA flows from southeast to northwest.) (Figure 3 represents groundwater flow across RMA.) In 1975 the Colorado Department of Health (CDH) issued three administrative orders to cease and desist the spread of contamination.

Late in 1977 construction began on a pilot containment/treatment system 250 feet south of the RMA northernmost boundary. The pilot system consisted of a bentonite slurry wall, groundwater dewatering wells, a granular activated carbon treatment facility and recharge wells. The goals of the pilot system were to establish the feasibility of barrier containment in dealing with groundwater contamination, and to collect data required for the development of a full-scale containment system.

In 1979 the pilot containment/treatment system was expanded. The slurry wall was extended to the east and the west. Additional dewatering wells were installed upgradient and recharge wells downgradient of the slurry wall. The treatment unit was expanded to treat the resulting additional flow. These expansions to the system were completed in January 1982.

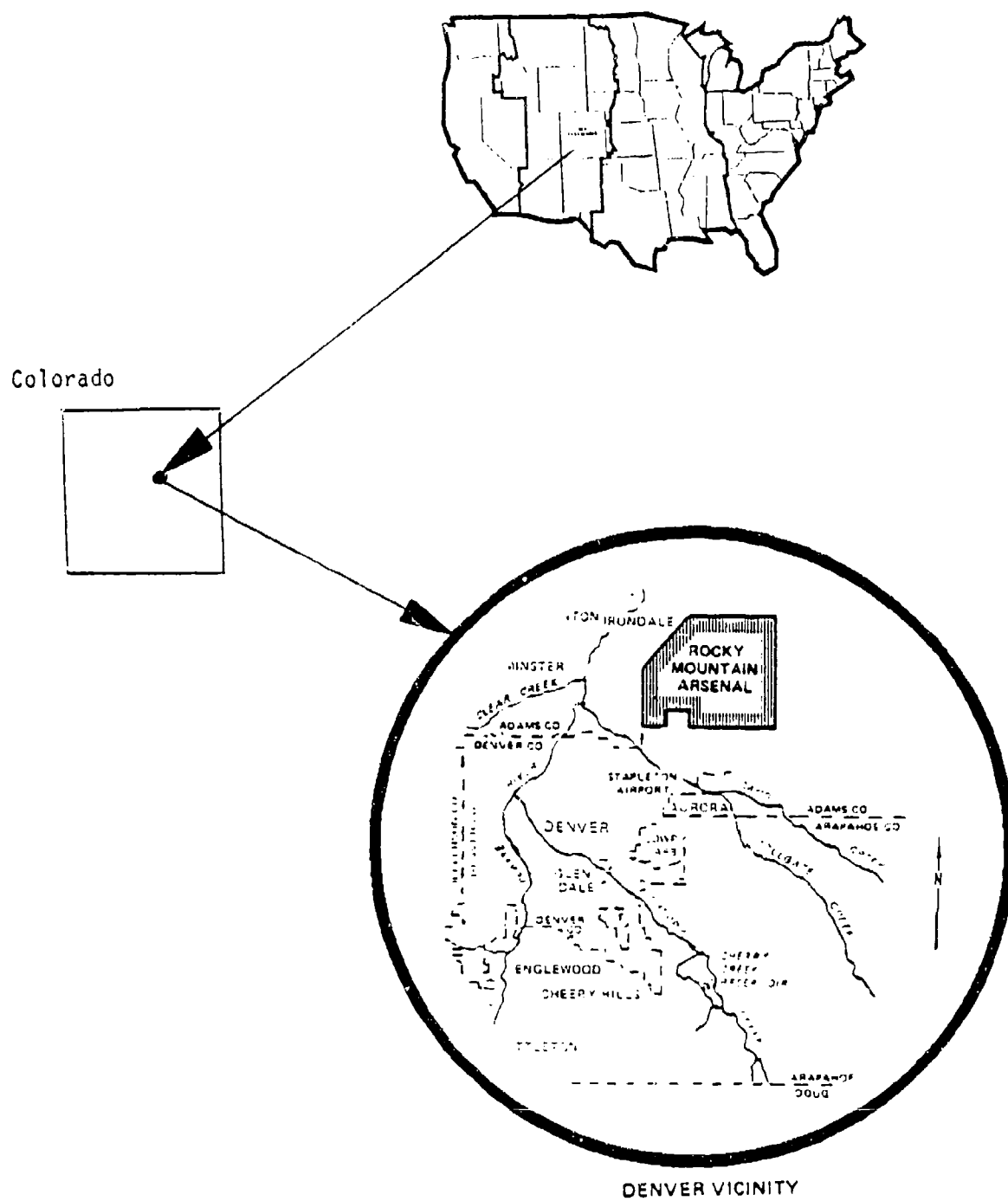


Figure 1. Installation Location Map.

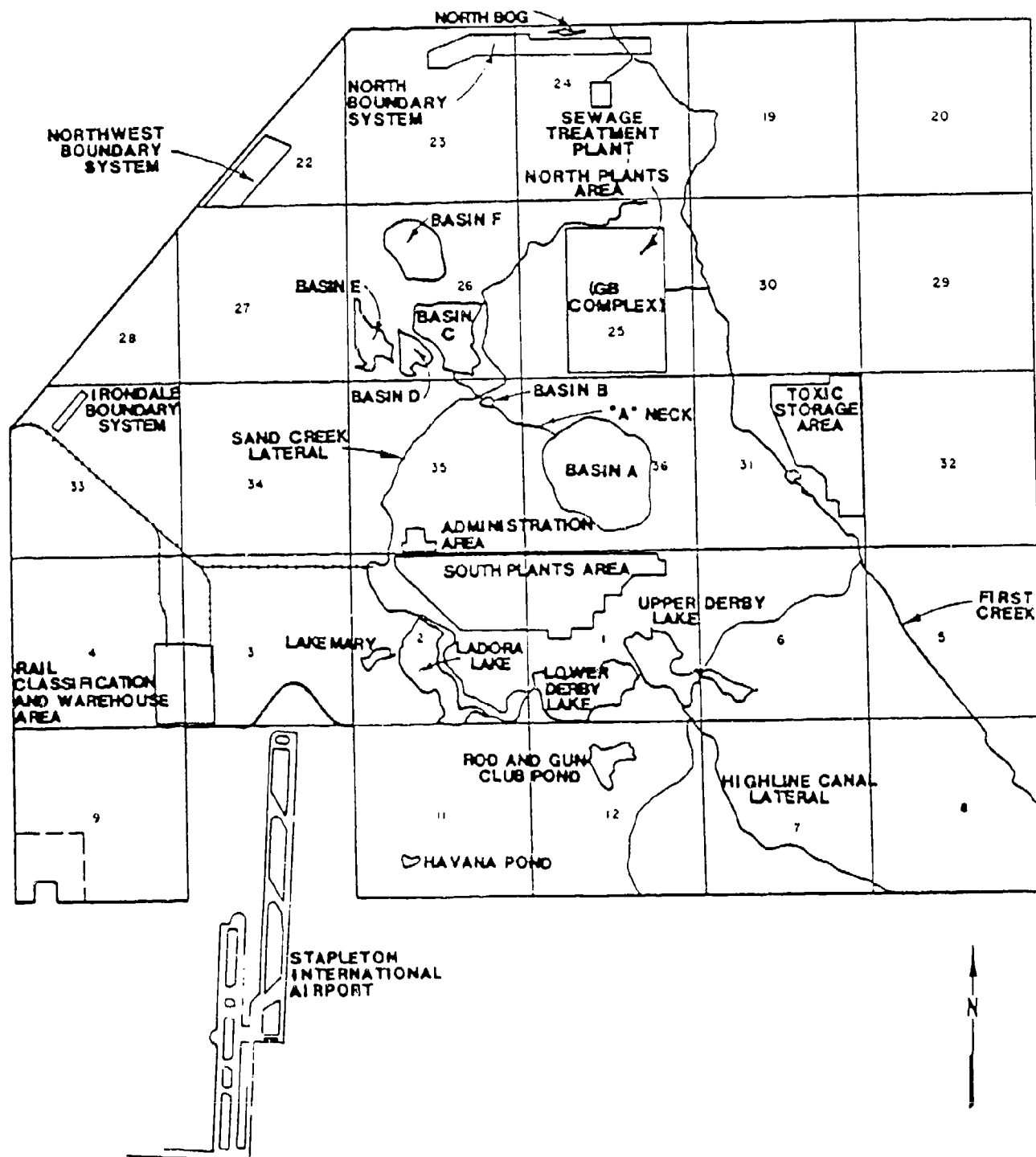


Figure 2. Rocky Mountain Arsenal Map

Source: Morrison-Knudsen Engineers, Inc.

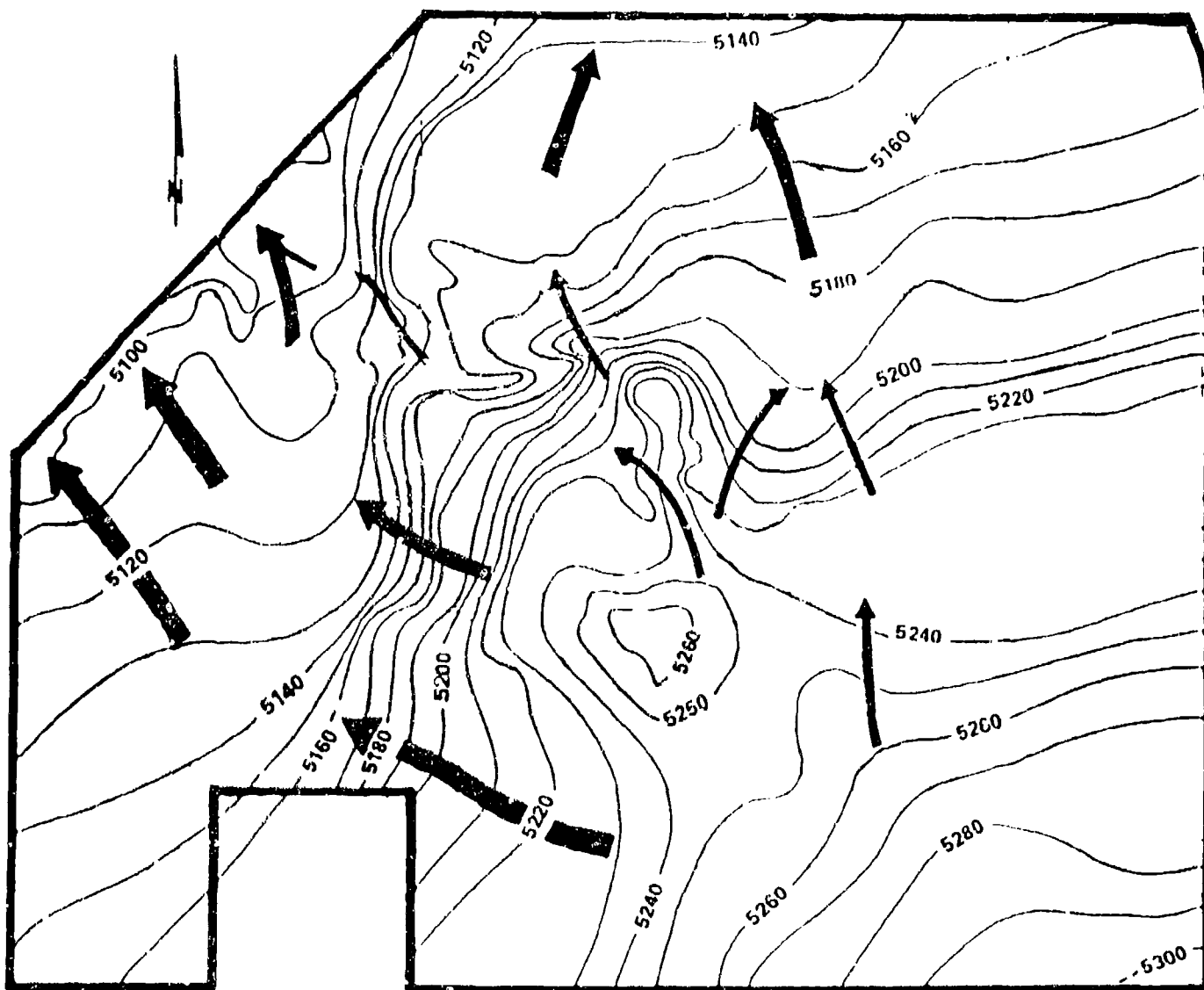


Figure 3. Groundwater Flow Across RMA

Source: Source Control Report (USATHAMA, 1983).



Figure 4 shows the existing North Boundary Containment/Treatment System. The groundwater barrier is located parallel to and 250 feet south of the northern boundary of Rocky Mountain Arsenal. It is a 6,470 foot long, 3 foot wide, bentonite slurry wall keyed into shale of the Denver formation at an average depth of approximately 30 feet. Fifty-four withdrawal wells pump contaminated groundwater from upgradient of the barrier to a carbon adsorption water treatment plant. The treatment plant includes a prefilter system for removing suspended solids; three 30,000 lb upflow, pulsed bed carbon adsorbers for removing organics; carbon transfer vessels; and both cartridge-and bag-type post-filters. Treated groundwater is discharged to a common sump prior to recharge. (Figure 5 is a schematic diagram of the treatment system.) Recharge to the alluvium is accomplished by 38 reinjection wells located downgradient of the slurry wall.

In December 1982, a Memorandum of Agreement (MOA) was entered into between the Colorado Department of Health, the U.S. Environmental Protection Agency, Shell Chemical Company, and the Army. The MOA initiated a cooperative development plan for a comprehensive remedy for the environmental situation at RMA.

A source control study (U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), 1983) was conducted over a three year period that resulted in the submission of a final report to the MOA parties in September 1983. This report identified several remedial actions to facilitate the restoration of RMA. One of the remedial actions specified was the North Boundary Containment/Treatment System.

On February 1, 1988, a proposed Consent Decree was lodged in the U.S. v. Shell Oil Company with the U.S. District Court in Denver, Colorado. The Army and Shell Oil Company agreed to share costs of the cleanup that was to be developed and performed under the oversight of the U.S. Environmental Protection Agency, with numerous opportunities for comment by the State of Colorado. The long term cleanup is a complex task that will take several years to complete. To facilitate more immediate remediation activities, the Consent Decree specifies a number of "interim" actions to alleviate the most urgent problems. One of these interim actions is implementation of groundwater recharge trenches to increase the rate of reinjection and improved distribution of treated groundwater in connection with the North Boundary System.

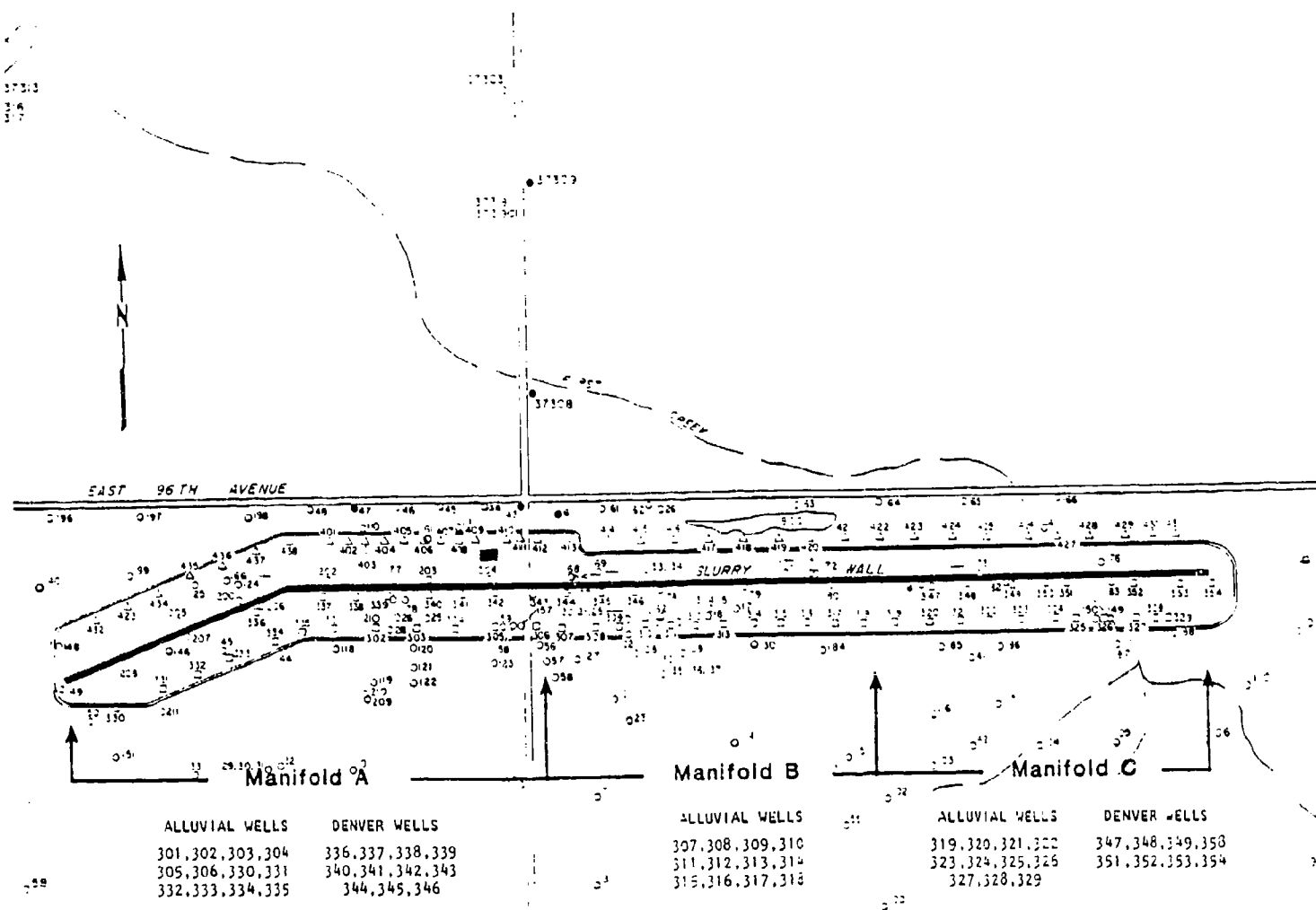


Figure 4. System Configuration, (1984 Numbers)

Source: 1984 "North Boundary Containment/Treatment System Performance Report," Volume II, USAE Waterways Experiment Station, December, 1985.

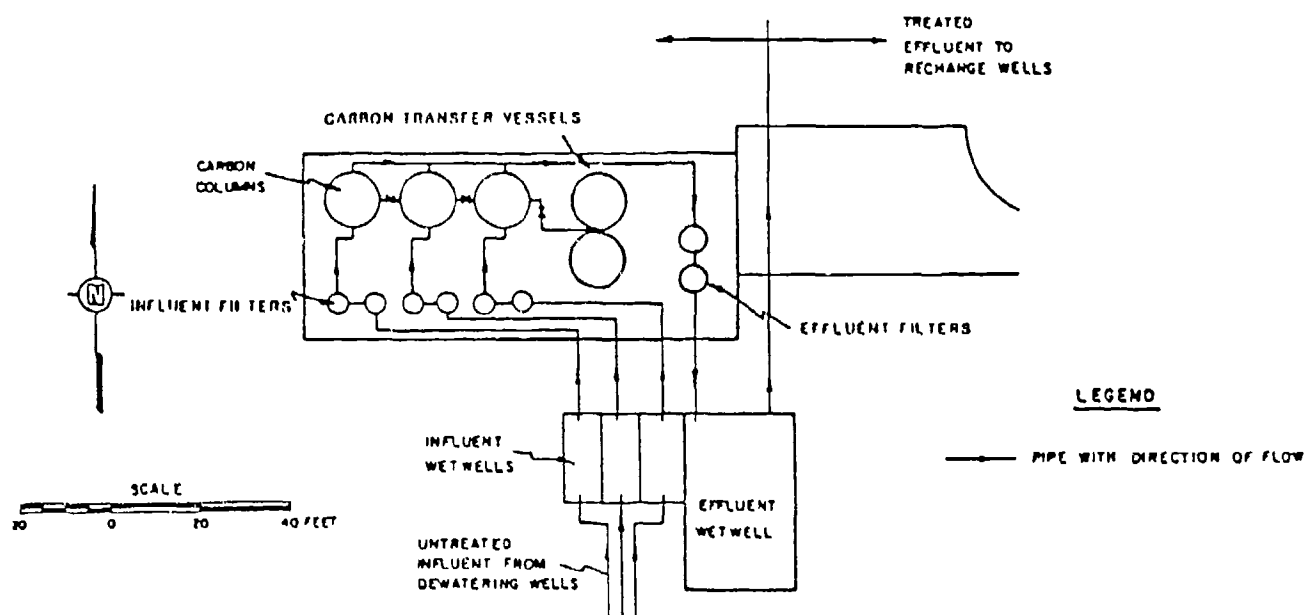


Figure 5. Ground Water Treatment Facility

Source: 1984 "North Boundary Containment/Treatment System Performance Report," Volume I, USAE Waterways Experiment Station, December, 1985.

### 3.0 INTERIM RESPONSE ACTION OBJECTIVES

The objectives of The Improvement of the North Boundary System Via Construction of Groundwater Recharge Trenches IRA are to meet a number of specific criteria. They are:

- o Increase recharge
- o Minimize technical complexity
- o Minimize cost
- o Operate year round
- o Fit geological setting
- o Operate manually except for automatic metering
- o Use pilot concept
- o Minimize silting
- o Minimize chemical and bacterial clogging
- o Minimize aeration and temperature change
- o Increase head on north side of barrier
- o Restore flow pattern and water table
- o Flush residual contaminants
- o Minimize evaporation (consumptive use of aquifer)
- o Meet designated ARARs

In addition to the specific objectives good engineering practices taken into consideration are that the improvement should:

- o Minimize maintenance
- o Be constructable as designed
- o Operate for an extended life
- o Be replaceable or repairable, if necessary

This decision document provides a summary of the alternative technologies considered, a chronology of the significant events leading to the initiation of the IRA, a summary of the IRA project, and a summary of the Applicable, or Relevant and Appropriate Requirements, standards, criteria, or limitations (ARARs) associated with the program.

#### 4.0 INTERIM RESPONSE ACTION ALTERNATIVES

Alternatives were examined in the February 1988, Draft Final Report, "Proposed Interim Ground-Water Recharge System, North Boundary Area," (Waterways Experiment Station, 1988).

Five options were studied as methods of increasing the recharge capacity:

- o Supplemental wells
- o Replacement wells
- o Open ponds
- o Deep gravel trenches
- o Shallow gravel trenches

Supplemental Wells: The installation of several new recharge wells to assist the existing wells distribute groundwater has been closely considered. The installation of new wells would entail exploring with expedient, low-cost borings to determine high recharge capacity locations, then constructing a series of new wells. The wells would be screened completely through the aquifer to achieve maximum recharge rates. The desired recharge rate could be attained by the installation of many supplemental wells, however, this option is not cost effective when compared to the trenches or ponds.

Replacement Wells: This option is a variant of the supplemental wells option described above. More emphasis would be placed on redrilling and re-equipping existing wells and on correcting problems with valves, piping and well screens. A smaller number of new wells may also be required.

The well replacement option would provide the required recharge capacity, but costs would be higher than the option that relies primarily on installing new, supplemental wells.

Both well options rely on proven technology. However, they do not satisfy one of the primary objectives of this interim action, that is, to provide pilot testing of techniques that may prove to be less costly and allow much higher recharge volumes. The wells options are each more expensive than trench or open pond options when measured on the basis of new recharge capacity per dollar.

Open Ponds: Recharge ponds are simple excavations, of variable dimensions, deep enough to penetrate in any strata having a low permeability coefficient. Recharge ponds can be open, wide trenches on level ground or diked ponds on gentle slopes. To minimize the amount of water lost due to evaporation some type of cover must be used. Commonly, floating impermeable membrane covers are used. Construction is relatively simple and normally inexpensive, and no unusual or specialized equipment is necessary. Both construction and maintenance can be performed using a backhoe or excavator. The system can be designed and constructed in segments to allow flexible application of flow.

Routine maintenance consists of scraping the silt and clay from the infiltrating surfaces. A major drawback of the open pond option is the high rate of evaporation resulting in substantial loss of water if a cover is not included. All of the water extracted is necessary to restore the hydraulic imbalance. The cost of purchasing a floating membrane cover and maintaining it to reduce evaporation loss makes this option more expensive than the trench options.

Deep Gravel Trenches: This option consists of excavating a narrow, deep trench penetrating the aquifer. The trenches will be filled with coarse gravel and have a perforated water pipe running the length of the trench. A compacted soil cap will be placed on top of the trench so that the water may be pumped into the trench under pressure. By penetrating the aquifer, a large vertical surface area can be used for recharge. The system is simple, cost effective, and can attain the desired recharge capacity. The cost for construction and maintenance is less than that of other options discussed. The constructability is the major unknown factor. Excavation and construction into the aquifer is a new concept that has not been adequately investigated at this time. Key construction steps have been outlined to prevent caving of the trench during construction due to low cohesive strength of saturated sand. Routine excavation will stop at the top of the saturated sand. In order to minimize wall caving, gravel placement will be accomplished at the same time as excavation below the water table. Operation of this type of a system is also an area where there is little experience.

Shallow Gravel Trenches: This consists of excavating long narrow trenches similar to deep trenches, except that the excavation would just penetrate the aquifer. The difference between shallow and deep trenches is that the shallow trenches access the aquifer only through the bottom surface of the trench. The advantages of this system are low cost, simplicity and ease of construction. This system may not attain the desired recharge capacity because the bottom surface of the trench is vulnerable to silt accumulation, leading to decreasing recharge. In addition, the vertical permeability of the aquifer at the trench bottom governs water velocity and is usually much less than the horizontal permeability.

Late in 1987, Colorado State University (CSU) released a "Summary of Model Calibration and Model Simulations to Date" (December 12, 1987) and almost simultaneously the U.S. Army Engineer Waterways Experiment Station (WES), Geotechnical Laboratory completed the document "Summary of WES Analysis of Proposed Recharge Trench System for RMA North Boundary" (January 28, 1988). Both of these efforts were performed as elements of Task 36, the assessment of final remedial actions for the NBC/TS. Both assumed the use of trenches in evaluating the effectiveness of the proposed recharge system. The reports concluded that the trenches do have the potential to achieve the desired recharge rate while being cost effective.

Deep gravel trenches provide the opportunity for a large capacity groundwater recharge pilot system. This technology has not been explored at RMA, but has the potential to be a useful method of recharge. Although the WES report indicated that constructibility of a deep trench was a major unknown factor, further review of construction techniques indicates that construction of the proposed trench system will not be a problem. The cost of the system based on dollars per gallon of recharge capacity, is less than any of the other alternatives considered.

## 5.0 CHRONOLOGY OF EVENTS

The 1984 report, "North Boundary Containment/Treatment System Performance Report," Volumes I and II (WES, 1985), identified problems related to hydraulics associated with the barrier. A significant difference in head across the barrier was documented which could result in a decrease in effectiveness of the system. This report concluded that if levels in recharge wells are not kept at a sufficient height, there is the potential to increase the flow of groundwater and associated contaminants through or under the barrier. The report also stated that if water levels upgradient and downgradient of the system can be balanced, the potential for groundwater to bypass the barrier can be eliminated. The 1984 report plotted contamination plumes for various groundwater contaminants approaching the north boundary. Recommendations were made to evaluate the recharge system associated with the north boundary system.

In response to the 1984 report, three major efforts were initiated. The first was Task 25, a long-term monitoring program to improve tracking of groundwater and contaminant movements. The second effort initiated was Task 36. The goals of Task 36 are to assess specific components of the NBC/TS as cited in the 1984 report (i.e., physical condition of the bentonite barrier, orientation and hydraulic conditions of the Denver Sand units, and evaluation of existing dewatering/recharge systems), which will ultimately lead to recommendations for long term improvements. The third effort was an investigation of the feasibility of using recharge trenches to alleviate the hydraulic gradient problem.

In September 1986, the Program Manager Staff Office for the Rocky Mountain Arsenal Contamination Cleanup requested WES to develop a conceptual design for an interim groundwater recharge system at the NBT area. In December 1986 WES completed their Draft "Proposed Interim Response Ground Water Recharge System" (WES, 1986). The report assesses several recharge options including the recommended trench system.

"Rocky Mountain Arsenal North Boundary Containment/Treatment System Operational Assessment Report FY85/86," Volumes I, II, & III released June 1987 indicates that the hydraulic imbalance continues to exist.

### 5.1 COORDINATION WITH THE PARTIES AND THE STATE

The U.S. Environmental Protection Agency, Shell Oil Company and the State of Colorado have received copies of the north boundary reports and have commented on them.

After the release of the 1984 report, "North Boundary Containment/Treatment System Performance Report" (WES, December 1985), the U.S. Environmental Protection Agency (EPA) Region VIII commented on the report and requested that there be an increase in head below the barrier to counteract potential pressure increases upgradient of the barrier. The State of Colorado also urged the implementation of the report's recommendations.



The Task 36 Technical Plan (ESE, 1987) was reviewed by U.S. EPA Region VIII and CDH. Both agencies made comments regarding the inadequate recharge system and the desired hydraulic conditions. These comments further emphasized the need for an interim response action.

In Shell Oil Company's comments on the Task 36 Technical Plan, Shell recommended that top priority be put on establishing adequate dewatering and recharge capacity needed to achieve the desired hydraulic gradient. Shell further supported this project by having one of their contractors prepare design specifications for the trenches.

## 6.0 SUMMARY OF THE INTERIM RESPONSE ACTION PROJECT

Deep gravel-filled trenches are selected as the best option for the proposed interim response action to enhance the groundwater recharge system for the North Boundary Containment/Treatment Facility. The basis for this selection is their large recharge capacity, ease of construction, minimal maintenance requirements, cost effectiveness, and likelihood of meeting ARARs.

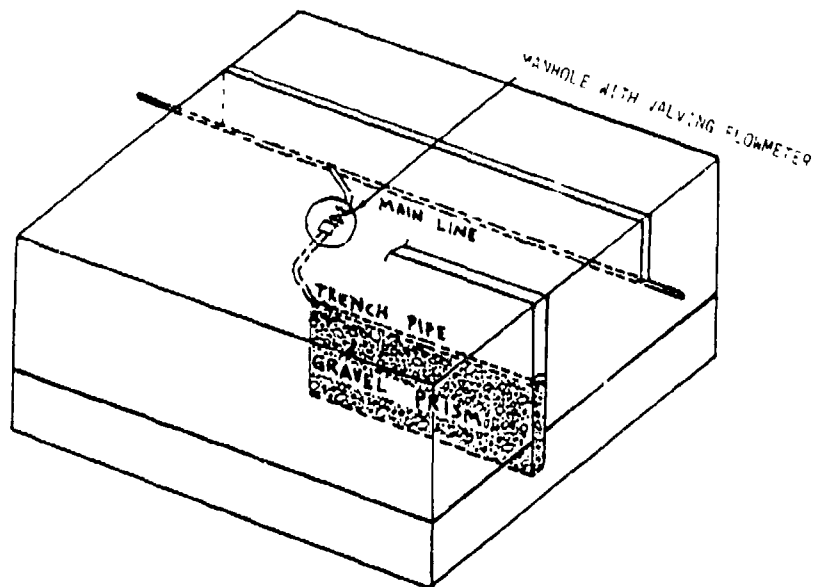
The basic design consists of installing ten gravel-filled trenches approximately 160 feet long, penetrating at least three feet into the alluvial aquifer. The recharge water coming from the treatment plant would be fed from one end of each trench longitudinally through a plastic pipe near the top of the gravel phase. An impermeable membrane would separate the gravel phase from soil backfill. Figure 6 illustrates the concept and design. A design objective is to achieve an initial maximum recharge rate of approximately 150 gpm. This will improve distribution of water on the western portion of the North Boundary System, where the hydraulic imbalance is the greatest.

The system instrumentation will be capable of measuring the rate of flow and the total accumulated flow into each recharge trench. Flow into each trench may be controlled by a gate valve. Pressure gauges will be installed in the discharge pipes in each trench, downstream of the flow metering equipment. Piezometers will be installed in each trench and near the containment wall for monitoring water levels. Each trench will be equipped with an access manhole in which the flow metering equipment, gate valve, and pressure gauge may be read.

### 6.1 HEALTH AND SAFETY PLAN

A health and safety plan has been developed for the prevention of occupational injuries and illnesses during field activities at RMA. This plan addresses health and safety requirements of contractors and their authorized subcontractors. Compliance with this plan will be compulsory and the contractors will be responsible for self-enforcement and compliance with this plan. The safety and health plan was developed taking into consideration known hazards as well as potential risks. Comprehensive environmental monitoring and site-specific personal protection are combined in an effort to best protect workers.

A site specific health and safety plan for work to be performed on the North Boundary trenches will be developed and included with the design specification package.



Typical Trench Design

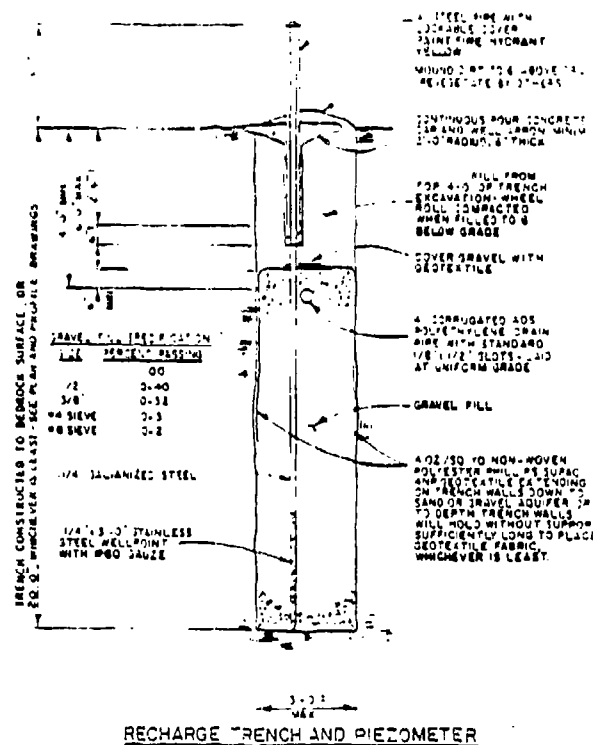


Figure 6. Recharge Trench Design

Source: Morrison Knudsen Engineering.

## 7.0 IRA PROCESS

With respect to this IRA for improvement of the North Boundary System through construction of the groundwater recharge trench, the IRA Process is as follows:

1. The scope of the IRA was described in the June 5, 1987 report to the Court of the United States (the Army and EPA), Shell and the State in United States v. Shell Oil Co.: "The parties also agree that the rate of reinjection of treated groundwater at the North Boundary Containment System should be increased to improve system performance. The United States, in cooperation with the parties, is assessing the feasibility of a groundwater recharge trench to be located just north of the boundary system. The objective of such a recharge trench is to enhance significantly the rate of reinjection of treated groundwater." Similar language appears in paragraph 9.1(b)(iii) of the proposed Consent Decree.

2. EPA, Shell and the State were afforded an opportunity to identify, on a preliminary basis, any potential APARS.

3. The Army is issuing this proposed Decision Document for the IRA for the Improvement of the North Boundary System RMA Via Construction of Groundwater Recharge Trench for a 30-day public comment period. The proposed Decision Document is also supported by an administrative record.

4. Promptly after the close of the comment period on the proposed Decision Document, the Army shall transmit to the other Organizations, DOI and the State a draft final IRA Decision Document.

5. Within 15 days of issuance of the draft final Decision Document for the IRA for the Improvement of the North Boundary System RMA Via Construction of Groundwater Recharge Trench, an Organization (or DOI where appropriate) may invoke Dispute Resolution.

6. After the close of the period for invoking Dispute Resolution (if Dispute Resolution is not invoked) or after the completion of Dispute Resolution (if invoked), the Army shall issue a final Decision Document for the IRA for the Improvement of the North Boundary System RMA Via Construction of Groundwater Recharge Trench. The Army shall also notify the public of the availability of the final IRA with the supporting record. Only preliminary design work for the IRA may be conducted prior to the issuance of the final IRA Decision Document.

7. Thereafter, the IRA for the Improvement of the North Boundary System RMA Via Construction of Groundwater Recharge Trench may be raised for judicial review in accordance with Sections 113 and 121 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. 9613 and 9621.

## 8.0 ARARs

### 8.1 ATTAINMENT OF ARARs

The interim action process reported to the Court on June 5, 1987, in United States v. Shell Oil Co. provides that the IRAs (including the IRA for the improvement of the North Boundary System RMA Via Construction of Groundwater Recharge Trench), shall, to the maximum extent practicable, attain ARARs. A similar provision appears in paragraph 9.7 of the proposed Consent Decree.

### 8.2 IDENTIFICATION AND SELECTION OF ARARs

By letter of January 19, 1988, counsel for the Army requested that EPA, Shell and the State preliminarily identify in writing the potential ARARs that they believe may be pertinent to the IRA for the Improvement of the North Boundary System RMA Via Construction of Groundwater Recharge Trench. EPA responded by letter of March 30, 1988 with its preliminary suggestions. Shell and the State did not nominate any potential ARARs for consideration.

### 8.3 SELECTION OF ARARs AND DETERMINATION OF ARAR IMPACT

#### 8.3.1 AMBIENT OR CHEMICAL-SPECIFIC ARARs

Ambient or chemical-specific requirements set health or risk-based concentration limits or ranges in various environmental media for specific hazardous substances, pollutants or contaminants. Such ARARs either set protective cleanup levels for the chemicals of concern in the designated media or indicate an appropriate level of discharge. There are no chemical-specific ARARs that are solely pertinent to this IRA for improvement of the North Boundary System through the construction of recharge trenches.

It is the Army's intent to address in North Boundary System - System Improvement IRA (IR-03-42) the ARARs that pertain to the treatment of contaminants in the groundwater that is being treated by the North Boundary System.

#### 8.3.2 LOCATION-SPECIFIC ARARs

##### 8.3.2.1 DESCRIPTION

Location requirements set restrictions on activities depending on the characteristics of the site or the immediate environment. These requirements function like action-specific requirements. Alternative remedial actions may be restricted or precluded depending on the location or characteristics of the site and the requirements that apply to it. With respect to this interim action, the provisions of 40 CFR 141.5 (siting requirements for public water systems) are relevant and appropriate.

The foregoing regulation does not constitute an "applicable" location-specific ARARs in this context. Neither the trenches to be constructed pursuant to this IRA nor the North Boundary System are intended to constitute a public water system; no one is presently drinking groundwater that is treated by the North Boundary System; and this IRA is being conducted pursuant to CERCLA, entirely on-site and in compliance with CERCLA Sections 120 and 121, 42 U.S.C. 9620 and 9621. Thus, the regulatory jurisdiction otherwise associated with the Safe Drinking Water Act and the National Primary Drinking Water Regulations simply does not arise. In these circumstances, the nature of the remedial action is such that the jurisdictional prerequisites of these requirements are not met. Thus, the identified regulation is not applicable here.

Nevertheless, Section 141.5 does address location-specific problems or situations sufficiently similar to those encountered at the RMA CERCLA site that use of this regulation is well-suited to the site and accordingly it will be treated as "relevant and appropriate". A requirement that is "relevant and appropriate" must be complied with to the same degree as if applicable. However, there is more discretion in this determination; it is possible for only part of a requirement to be considered relevant and appropriate; the last being dismissed if judged not to be relevant and appropriate in a given case.

Accordingly, the trenching improvements of the North Boundary System will be located to conform to the substantive siting provisions of 40 CFR 141.5 as follows:

- (i) The trenching improvements will not be located where there is a significant risk from earthquakes, floods, fires or other disasters which could cause a breakdown of these improvements; and
- (ii) The trenching improvements will not be located within the floodplain of a 100-year flood.

It should be noted that Paragraphs 23.2(e) and (f) of the proposed Consent Decree provide that:

- (e) Wildlife habitat(s) shall be preserved and managed as necessary to protect endangered species of wildlife to the extent required by the Endangered Species Act, 16 U.S.C. 1531 et seq., migratory birds to the extent required by the Migratory Bird Treaty Act, 16 U.S.C. 7031 et seq., and bald eagles to the extent required by the Bald Eagle Protection Act, 16 U.S.C. 668 et seq.
- (f) Other than as may be necessary in connection with a Response Action or as necessary to construct or operate a Response Action Structure, there shall be no change permitted in the geophysical characteristics of RMA that has a significant effect on the natural drainage at RMA for floodplain management, recharge of groundwater, operation and maintenance of Response Action Structures, and protection of wildlife habitat(s).

While these provisions are not ARARs, they obviously must be complied with for purpose of this IRA. Based on where the North Boundary trenching improvements will be located, as well as when and where the IRA will take place, the Army believes that this IRA will have no adverse impact on any endangered species or migratory birds, or on the protection of wildlife habitats.

Moreover, the Army has separately determined that this IRA will not change the physical characteristics of RMA in a manner that will have significant effect on the natural drainage of RMA for floodplain management, recharge of groundwater and the operation and maintenance of Response Action Structures.

### 8.3.3 PERFORMANCE, DESIGN OR OTHER ACTION-SPECIFIC ARARs

#### 8.3.3.1 DESCRIPTION

Performance, design or other action-specific requirements set controls or restrictions on particular kinds of activities related to the management of hazardous substances, pollutants, or contaminants. These action-specific requirements may specify particular performance levels, actions or technologies, as well as specific levels (or a methodology for setting specific levels) for discharged or residual chemicals.

#### 8.3.3.2 SPECIFIC LEVELS FOR DISCHARGED OR RESIDUAL CHEMICALS

The ARARs pertinent for the discharged or residual chemicals after processing by the North Boundary System, (including the trenching improvements), are described in Part 8.3.1 of this document.

#### 8.3.3.3. CONSTRUCTION OF TRENCHES

##### 8.3.3.3.1 AIR EMISSIONS

On the remote possibility that there may be air emissions during the course of the construction of the trenching improvements, the Army has reviewed all potential ambient or chemical-specific air emission requirements. As a result of this review, the Army found that there are, at present, no national or State ambient air quality standards currently applicable or relevant and appropriate to any of the volatile or semi-volatile chemicals in the groundwater found in the immediate southern vicinity of the North Boundary System.

Of course, in the context of this IRA, there is only a very remote chance of any release of volatiles or semi-volatiles and, even if such a release did occur, it would only be intermittent and of very brief duration (because the activity that produced the release would be stopped and modified appropriately if a significant air emission was detected by the contractor's air monitoring specialist).

#### 8.3.3.3.2 WORK PROTECTION

With respect to the workers directly participating in this IRA, the worker protection requirements of Section 126 of the Superfund Amendments and Reauthorization Act of 1986 shall be met through compliance with the OSHA interim final rule that appears in 51 Fed. Reg. 45654 (1986)<sup>1</sup>.

#### 8.3.3.3.3. GENERAL CONSTRUCTION ACTIVITIES

The following performance, design or other action-specific State ARARs are selected by the Army as relevant and appropriate to this portion of the IRA and more stringent than any applicable or relevant and appropriate Federal standard, requirement, criterion or limitation:

- (i) Colorado Air Pollution Control Commission Regulation No. 1, 5 CCR 1001-3, Part III(A)(1), "Fuel Burning Equipment":

No owner or operator shall cause or permit to be emitted into the atmosphere from any fuel-burning equipment, particulate matter in the flue gases which exceeds the following:

- a. 0.5 lbs. per  $10^6$  BTU heat input for fuel burning equipment of less than or equal to  $1 \times 10^6$  BTU/hr. total heat input design capacity;
- b. For fuel burning equipment with designed heat inputs greater than  $1 \times 10^6$  BTU per hour, but less than or equal to  $500 \times 10^6$  BTU per hour, the following equation will be used to determine the allowable particulate emission limitation:

$$PE = 0.5(FI) - 0.26$$

Where:

PE = Particulate Emission in pounds (lbs) per million BTU heat input

FI = Fuel Input in million BTU per hour

- c. 0.1 lbs. per  $10^6$  BTU heat input for fuel burning equipment of greater than  $500 \times 10^6$  BTU per hour or more.
- d. If two or more fuel burning units connect to any opening, the maximum allowable emission rate shall be calculated by summing the allowable emissions from the units being operated.

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<sup>1</sup>Although OSHA proposed a permanent final rule on August 10, 1987, 52 Fed. Reg. 29620, the comment period on this rule did not close until October 5, 1987. It should be noted that, pursuant to CERCLA Section 301(f), 42 U.S.C. 9651(f), the NCP is to be amended by December 11, 1988 to provide procedures for the protection of the health and safety of employees involved in response actions.



(ii) Colorado Air Pollution Control Commission Regulation No. 1, 5 CCR 100-3, Part III(D)(2)(b), "Construction Activities":

(i) Applicability - Attainment and Nonattainment Areas

(ii) General Requirement

Any owner or operator engaged in clearing or leveling of land or owner or operator of land that has been cleared of greater than one (1) acre in nonattainment areas from which fugitive particulate emissions will be emitted shall be required to use all available and practical methods which are technologically feasible and economically reasonable in order to minimize such emissions in accordance with the requirements of Section III.D. of this regulation.

(iii) Applicable Emission Limitation Guideline

Both the 20% opacity and the no off-property transport emission limitation guidelines shall apply to construction activities; except that with respect to sources or activities associated with construction for which there are separate requirements set forth in this regulation, the emission limitation guidelines there specified as applicable to such sources and activities shall be evaluated for compliance with the requirements of Section III.D. of this regulation.

(Cross Reference: Subsections e. and f. of Section III.D.2 of this regulation.)

(iv) Control Measures and Operating Procedures

Control measures or operational procedures to be employed may include, but are not necessarily limited to, planting vegetation cover, providing synthetic cover, watering, chemical stabilization, furrows, compacting, minimizing disturbed area in the winter, wind breaks and other methods or techniques. . . .

(iii) Colorado Ambient Air Quality Standards, 5 CCR 1001-14, Air Quality Regulation A, "Diesel-Powered Vehicle Emission Standards for Visible Pollutants":

- A. No person shall emit or cause to be emitted into the atmosphere from any diesel-powered vehicle any air contaminant, for a period greater than 10 consecutive seconds, which is of such a shade or density as to obscure an observer's vision to a degree in excess of 40% opacity, with the exception of Subpart B below.

- B. No person shall emit or cause to be emitted into the atmosphere from any naturally aspirated diesel-powered vehicle of over 8,500 lbs. gross vehicle weight rating operated above 7,000 feet (mean sea level), any air contaminant for a period greater than 10 consecutive seconds, which is of such a shade or density as to obscure an observer's vision to a degree in excess of 50% opacity.
- C. Diesel-powered vehicles exceeding these requirements shall be exempt for a period of 10 minutes, if the emissions are a direct result of a cold engine start-up and provided the vehicle is in a stationary position.
- D. This standard shall apply to motor vehicles intended, designed and manufactured primarily for use in carrying passengers or cargo on roads, streets and highways.

The following performance, design or action-specific State ARAR is applicable to this portion of the IRA and is more stringent than any applicable or relevant and appropriate federal standard, requirement, criterion or limitations:

(iv) Colorado Noise Abatement Statute, C.R.S. Section 25-12-103:

- (1) Every activity to which this article is applicable shall be conducted in a manner so that any noise produced is not objectionable due to intermittence, beat frequency, or shrillness. Sound levels of noise radiating from a property line at a distance of twenty-five feet or more therefrom in excess of the db(A) established for the following time periods and zones shall constitute prima facie evidence that such noise is a public nuisance:

Zone	7:00 a.m. to next 7:00 p.m.	7:00 p.m. to next 7:00 a.m.
Residential	55 db(A)	50 db(A)
Commercial	60 db(A)	55 db(A)
Light industrial	70 db(A)	65 db(A)
Industrial	80 db(A)	75 db(A)

- (2) In the hours between 7:00 a.m. and the next 7:00 p.m., the noise levels permitted in subsection (1) of this section may be increased by ten db(A) for a period of not to exceed fifteen minutes in any one-hour period.

- (3) Periodic, impulsive, or shrill noises shall be considered a public nuisance when such noises are at a sound level of five db(A) less than those listed in subsection (1) of this section.

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- (5) Construction projects shall be subject to the maximum permissible noise levels specified for industrial zones for the period within which construction is to be completed pursuant to any applicable construction permit issued by proper authority or, if no time limitation is imposed, for a reasonable period of time for completion of project.

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- (8) For the purpose of this article, measurements with sound level meters shall be made when the wind velocity at the time and place of such measurement is not more than five miles per hour.

- (9) In all sound level measurements, consideration shall be given to the effect of the ambient noise level created by the encompassing noise of the environment from all sources at the time and place of such sound level measurement.

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In substantive fulfillment of Colorado Air Pollution Control Commission Regulation No. 1, this IRA will employ the specified methods for minimizing emissions from fuel burning equipment and construction activities. In substantive fulfillment of Colorado's Diesel-Powered Vehicle Emission Standards, no diesel motor vehicles associated with the construction shall be operated in a manner that will produce emissions in excess of those specified in these standards.

The noise levels pertinent for construction activity provided in C.R.S. Section 25-12-103 will be attained in accordance with this applicable Colorado statute.

#### 8.3.3.3.4 REMOVAL OF SOIL FROM TRENCHES

There are no action-specific ARARs that pertain to the removal of soil during the construction of the trenches.

Although not an ARAR, removal of soil from the areas where the North Boundary System trenches are to be located will be performed in accordance with the

procedures set forth in the Task No. 32 Technical Plan -- Sampling Waste Handling (November 1987) and EPA's July 12, 1985 memorandum entitled "EPA Region VIII procedure for handling of materials from drilling, trench excavation and decontamination during CERCLA RI/FS operations at the Rocky Mountain Arsenal." In general, any excavated soils generated during the course of this IRA, either at surface or subsurface will be returned to the trenches from which they were excavated in reverse order from which they were removed (i.e., last out, first in). Any excavated materials that remain after all backfilling has been completed, which are suspected of being contaminated based on field screening techniques,<sup>2</sup> will be properly stored, sampled, analyzed, and ultimately disposed of as nonhazardous or CERCLA hazardous wastes<sup>3</sup> as appropriate.

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<sup>2</sup>The field screening techniques to be used to determine contamination are HNU, OVA, discoloration (visual) and odor. Readings or visual and odor inspection will be taken at least every five feet.

<sup>3</sup>It should be noted that the "land ban" provisions of RCRA Section 3004, 42 U.S.C. 6924, are not pertinent to any such excavated soil that is identified as contaminated because the disposal and storage of these soils will be undertaken solely pursuant to 42 U.S.C. 9606 and thus will be subject to the exception in 42 U.S.C. 6924(d) (4) for CERCLA response actions taken through November 9, 1988, and thereafter to the exception in 42 U.S.C. 6924(j) for storage "solely for the purpose of accumulation of such quantities of hazardous waste as are necessary to facilitate proper recovery, treatment or disposal" since this waste will ultimately be subject to treatment pursuant to the ROD for the pertinent CERCLA operable unit.

## 9.0 SCHEDULE

It is estimated that a Draft Implementation Document can be issued within 30 days after the release of the Final Interim Response Action Decision Document (IRADD). It is anticipated that preliminary design and discussion with the parties and the state will proceed concurrently with the review of the Draft IRADD in order to expedite preparation of the Draft Implementation Document.

#### 10.0 CONSISTENCY WITH THE FINAL REMEDIAL ACTION

Performance of the NBC/TS and identification of final remedial actions to improve this system's performance are being accomplished by the ongoing Task 36. Task 36 was initiated at the same time as the evaluation of interim action for NBC/TS. Based upon the WES recommendation of deep trenches for the interim action, hydrogeologic modeling for Task 36 has incorporated simulated deep trenches. The deep trenches will be consistent with any final remedial action selected for the NBC/TS.

## 11.0 REFERENCES

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